> | Code No. | $\mathrm{T}-\mathbf{2 1 2 0}$ |
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## Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2024

## CSS

COMPUTATIONAL BIOLOGY WITH SPECIALIZATION IN (COMPUTER AIDED DRUG DESIGN/NGS DATA ANALYTICS)

## General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be $(\checkmark)$ 'tick marked' only in the "Response Sheet" provided.
3. Negative marking : $\mathbf{0 . 2 5}$ marks will be deducted for each wrong answer .

Time : 2 Hours

To be filled in by the Candidate

| Register <br> Number | in Figures |  |  |  |  |  |  |  |  |
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|  | in words |  |  |  |  |  |  |  |  |

Choose appropriate answer from the options in the questions.

$$
\text { (100 } \times 1 \text { = } 100 \text { marks) }
$$

1. Which one of the following conditions will switch on Lac operon in E. coli?
A. + Glucose, + Lactose
B. + Glucose, - Lactose
C. - Glucose, - Lactose
D. - Glucose, + Lactose

2. Adenosine, guanosine, thymidine, uridine, uridine are all ___ but adenylic acid, guanylic acid, thymidylic acid, uridylic acid, cytidylic acids are
A. Nucleotides, Nucleosides
B. Nucleosides, Nucleotides
C. Nucleotides, Nucleic acids
D. Nucleosides, Nucleic acids
3. In a DNA molecule, the phosphate group is attached to carbon of the sugar residue of its own nucleotide and ___ carbon of the sugar residue of the next nucleotide by bonds.
A. 5', 3, phosphodiester
B. 5, 3', glycosidic
C. 3', 5', phosphodiester
D. 3', 5', glycosidic
4. Pyrimidines have nitrogen atoms at ___ positions.
A. $1^{\prime}, 3^{\prime}, 7^{\prime}, 9^{\prime}$
B. $1^{\prime}, 5^{\prime}, 7^{\prime}, 9^{\prime}$
C. $1^{\prime}, 3^{\prime}$
D. 1', 9'
5. On a ribosome, the mRNA is read from $\qquad$ and the polypeptide chain is synthesized from $\qquad$
A. $3^{\prime}$ to $5^{\prime} ; \mathrm{C}$ to N terminus
B. $3^{\prime}$ to $5^{\prime} ; \mathrm{N}$ to C terminus
C. 5 ' to 3 '; N to C terminus
D. 5' to 3 '; C to N terminus
6. During DNA replication the synthesis of leading strand of DNA results in fragments known as:
A. Satellite segments
B. Kornberg segment
C. Double-helix segment
D. Okazaki fragment
7. Eukaryotic RNA polymerase II transcribes:
A. rRNA and tRNA genes
B. mRNA and tRNA genes
C. mRNA and 5S rRNA genes
D. mRNA, miRNA and snRNA genes
8. The melting temperature (tm) of DNA is higher when the content of:
A. A:T base pairs is higher
B. $\mathrm{G}: \mathrm{C}$ base pairs is higher
C. $\mathrm{G}: \mathrm{C}$ base pairs is lower
D. A : T base pairs is same as $G: C$ base pairs
9. The mRNA codon of valine is:
A. UGG
B. GUG
C. CCA
D. TTG
10. On sequence analysis of a double stranded DNA, the results showed the content of cytosine, C was $20 \%$. What is the amount of A and T put together?
A. $20 \%$
B. $30 \%$
C. $50 \%$
D. $60 \%$
11. The length of a coding region in an mRNA is 897 bases. How many amino acids will be there in the polypeptide synthesized using this mRNA?
A. 297
B. 298
C. 299
D. 897
12. Origin of replication usually contains
A. GC rich sequences
B. Both AT and GC rich sequences
C. No particular stretch of sequences
D. AT rich sequences
13. Which of the following enzymes is NOT a part of the DNA replication machinery?
A. DNA helicase
B. Primase
C. DNA polymerase
D. DNA endonuclease
14. The term Gene was coined by:
A. H. Khorana
B. A. Kornberg
C. W. Johannsen
D. M. Nirenberg
15. In electrophoresis, DNA would migrate towards:
A. Anode or positive electrode
B. Anode or negative electrode
C. Cathode or negative electrode
D. None of the above
16. The central dogma of molecular biology was proposed by:
A. Rosalind Franklin
B. Francis Crick
C. Alec Jeffrey
D. Hargobind Khorana
17. Human genome project was initiated in
A. 1985
B. 2000
C. 1990
D. 2003
18. The component present in both nucleotides and nucleosides
A. Sugar
B. Phosphate
C. Nitrogenous base
D. Both $(A)$ and $(C)$
19. In cytoplasm, synthesis of protein at ribosomes is called:
A. Translation
B. Transcription
C. Replication
D. Transduction
20. The first protein sequenced by Frederick Sanger was:
A. Insulin
B. Hemoglobin
C. Myosin
D. Myoglobin
21. What is the purpose of the "if" statement in programming?
A. To repeat a block of code
B. To define a function
C. To make a decision based on a condition
D. To declare a variable
22. \#include <stdio.h>
int main()
\{
int $\mathrm{i}=1,2,3$;
printf("\%d", i);
return 0;
\}
A. 1
B. 3
C. Garbage value
D. Compile time error
23. In relational databases, which term uniquely identifies each row in a table?
A. Attribute
B. Tuple
C. Primary Key
D. Foreign Key
24. What is the binary equivalent of the decimal number 42 ?
A. 100100
B. 101010
C. 110110
D. 111010
25. What term describes a blueprint for creating objects in object-oriented programming?
A. Class
B. Object
C. Method
D. Attribute
26. $\qquad$ is a type of memory circuitry that holds the computer's start-up routine.
A. RIM (Read Initial Memory)
B. RAM (Random Access Memory)
C. ROM (Read Only Memory)
D. Cache Memory
27. An ASCII is a character-encoding scheme that is employed by personal computers in order to represent various characters, numbers and control keys that the computer used selects on the keyboard. ASCII is an acronym for
A. American Standard Code for Information Interchange
B. American Standard Code for Intelligent Information
C. American Standard Code for Information Integrity
D. American Standard Code for Isolated Information
28. Which data structure follows the Last In, First Out (LIFO) principle?
A. Queue
B. Stack
C. Linked List
D. Array
29. Which protocol is used for secure communication over a computer network, providing encrypted connections?
A. FTP
B. HTTP
C. SSH
D. TeInet
30. Which among the following is not a security/privacy risk?
A. Spam
B. Virus
C. Hacking
D. Phishing
31. A compiler is used to convert the following to object code which can be executed
A. Low level language
B. Assembly language
C. High level language
D. Natural Language
32. Which Al technique is inspired by the process of natural selection and genetics?
A. Expert Systems
B. Genetic Algorithms
C. Neural Networks
D. Reinforcement Learning
33. Which type of machine learning algorithm is suitable for handling sequential data, such as time series or natural language processing tasks?
A. Supervised Learning
B. Unsupervised Learning
C. Reinforcement Learning
D. Recurrent Neural Networks (RNNs)
34. What is the purpose of the convolution operation in a Convolutional Neural Network (CNN)?
A. To flatten the input data
B. To compute the gradient during backpropagation
C. To extract features from the input data
D. To compute the final classification scores
35. Which of the following is an example of an unsupervised learning algorithm?
A. Linear Regression
B. Decision Trees
C. K-Means Clustering
D. Support Vector Machines
36. Which element possesses properties of both alkali metal and halogen?
A. Sodium
B. Hydrogen
C. Chlorine
D. Helium
37. The type of hybridisation in $\mathrm{BCl}_{3}$ molecule
A. SP
B. $\mathrm{Sp}^{2}$
C. $\mathrm{SP}^{3}$
D. $S p^{3} d$
38. The current age of $X$ and $Y$ are in the ratio of $5: 4$ respectively. Three years hence the ratio of their ages will become 11:9 respectively. What is Y's present age in years.
A. 24
B. 27
C. 40
D. 42
39. Find the missing number in the end of the given series: $3,11,19,27$, ?
A. 35
B. 37
C. 33
D. 41
40. If miles per gallon goes up by $50 \%$, what happens to gallons per mile?
A. Goes up by $50 \%$
B. Goes down by $50 \%$
C. Goes down by $2 / 3$
D. Goes down by a third
41. The sale of children's bicycles accounted for one-third of total bicycle sales in the China. There was a rise in total market growth by $20 \%$ and the sales of children's bicycles are $90 \%$ of the previous year. What was the growth in sales of other bicycles relative to the previous year?
A. $13.5 \%$
B. $35 \%$
C. $47 \%$
D. $33 \%$
42. ' $\sigma$ factor' is a part of
A. Eukaryotic RNA polymerase
B. Eukaryotic DNA polymerase
C. E.coli RNA polymerase
D. E. coli DNA polymerase
43. 'Rho' is
A. ATP-dependent
B. Helicase
C. Required for transcription termination
D. All the above
44. Which of the following is a DNA binding protein?
A. $\sigma$ factor
B. Rho
C. Cro
D. All the above
45. The rRNA genes of eukaryotes are mostly transcribed by
A. RNA pol I
B. RNA poll
C. RNA pol III
D. RNA pol IV
46. TATA box is
A. Recognised by RNA polymerase
B. Recognised by transcription factors
C. Is present in the operator region
D. All the above
47. ___ is/are required for RNA capping.
A. RNA 5' triphosphatase
B. Guanine-7-methyl transferase
C. 2'-O-methyl transferase
D. All the above
48. Small Nuclear Ribonuclear proteins
A. contain RNA
B. are part of spliceosomes
C. are ribozymes
D. All the above
49. RNAse activity is exhibited by
A. Drosha
B. Telomerase
C. Rho
D. All the above
50. Upstream regulatory elements comprise of
A. Transcription factors
B. Factors that enhances DNA replication
C. Enhancers and silencers
D. 5 ' UTR
51. Which of the following is a polymerase?
A. HindIII
B. Pfu
C. $T f I$
D. Cas9
52. Match list $A$ with list $B$
A
(i) Cas9
(ii) Terminal uridylyl transferase
(iii) Telomerase
(iv) Methyl transferase
A. (i)-(3), (ii)-(1), (iii)-(4), (iv)-(2)
C. (i)-(3), (ii)-(4), (iii)-(1), (iv)-(2)
B. (i)-(4), (ii)-(3), (iii)-(1), (iv)-(2)
D. (i)-(4), (ii)-(3), (iii)-(2), (iv)-(1)
53. A restriction enzyme with a 8 bp recognition site will cut on average every
A. 4096 bp
B. 1296 bp
C. 36 bp
D. None of the above
54. Pseudouridine, methylguanosine, dimethylguanosine and methylinosine are seen in
A. Synthetic DNA
B. tRNA
C. MiRNA
D. SiRNA
55. $\mathrm{tRNA}_{f}^{\text {Met }}$ is seen in
A. E. coil
B. Spinacia oleracea
C. Apium graveolens
D. Amoeba
56. rRNA function to bind to
A. tRNA
B. Shine-Dalgarno sequence
C. miRNA
D. All the above
57. Peptidyl transferase activity is
A. due to 23 S rRNA
B. due to 50S subunit of ribosome
C. transfer of growing polypeptide
D. all the above
58. Human genome contains
A. 70\% junk DNA
B. $70 \%$ coding region
C. $14 \%$ coding region
D. $3 \%$ repetitive DNA
59. Cytosine methylation is required for
A. Epigenetic regulation
B. Genomic imprinting
C. Activation-deactivation of chromosomes
D. All the above
60. Single-strand binding proteins
A. are required during DNA replication
B. exhibit helicase activity
C. are also known as topoisomerase I
D. are also known as topoisomerase II
61. DNA primase is a
A. DNA polymerase
B. Recombinase
C. RNA polymerase
D. DNA helicase
62. An aircraft flies 930 miles in 75 minutes. How many miles does it fly in 4 hours 45 minutes assuming a constant speed?
A. 3112
B. 3477
C. 3534
D. 3522
63. A tap can empty a tank in 30 minutes while a second tap can empty it in 20 minutes. If both the taps are kept open, how much time is required to empty the tank?
A. 20 minutes
B. 12 minutes
C. 25 minutes
D. 55 minutes
64. A train starts from $A$ towards $B$ with a speed $75 \mathrm{~km} / \mathrm{h}$. Another train starts from $B$ with a speed of $60 \mathrm{~km} / \mathrm{h}$ towards $A$. Both of them meet after 12 minutes. Find the distance between $A$ and $B$
A. 30 km
B. 65 km
C. 25 km
D. 27 km
65. Two metro trains start at the same time from the same station 300 km apart going in opposite directions cross each other at a distance of 180 km . What is the ratio of their speeds?
A. 3:2
B. $3: 4$
C. $2: 3$
D. $4: 5$
66. Identify the number in this series; $8,6,9,23,87, \ldots$ What number should come next?
A. 126
B. 429
C. 324
D. 249
67. Which of the following is NOT a database management software?
A. MySQL
B. Oracle
C. SQL
D. Pascal
68. Sum of squares if three natural numbers is 149 . Then the sum of these numbers is
A. 20
B. 21
C. 24
D. 26
69. In a row of students, Sumesh is $14^{\text {th }}$ from the left and Suresh is $18^{\text {th }}$ from right. If they interchange their positions, Sumesh becomes $6^{\text {th }}$ from left. Then what will be the position of Suresh from the right?
A. $21^{\mathrm{st}}$
B. $20^{\text {th }}$
C. $10^{\text {th }}$
D. $9^{\text {th }}$
70. $\sqrt{221^{2}-220^{2}}$
A. 1
B. 441
C. 21
D. None of these
71. When the two hands are in opposite direction then what is the difference of degree and min between the two hands?
A. $180^{\circ}$ and 15 min
B. $180^{\circ}$ and 30 min
C. $60^{\circ}$ and 15 min
D. $120^{\circ}$ and 10 min
72. If $A=1, B=2, C=3$ and so on until $Z=26$, what is the numerical value of the word "LOGIC"?
A. 21
B. 27
C. 54
D. 63
73. Five friends - Nisha, Bobby, Ramesh, David and Thomas - are sitting around a round table. If Nisha is to the left of David and Bobby is to the right of Ramesh, who is sitting between Nisha and Bobby?
A. Ramesh
B. David
C. Thomas
D. None
74. In a group of 80 people, 45 people like coffee, 50 people like tea, and 20 people like both coffee and tea. How many people in the group do not like either coffee or tea?
A. 10
B. 15
C. 25
D. 30
75. Find the number of triangles in the given figure.

A. 12
B. 18
C. 22
D. 26
76. Find the minimum number of straight lines required to make the given figure.

A. 16
B. 17
C. 18
D. 19
77. In a row of certain persons, Sam is sitting 285 from the left end and 412 from the right end. Find out the total number of persons in that row?
A. 697
B. 698
C. 696
D. None of the above
78. The positions of how many digits in the number 2451479638 will remain same when the first half and the second half of the digits are arranged in ascending order separately?
A. Only one
B. Two
C. Three
D. None
79. Assertion: (L) A saltwater fish drinks seawater whereas a freshwater fish never drinks water.
Reason: (R) A saltwater fish is hypertonic to its environment while a freshwater fish is not hypertonic to its environment.
A. If both (L) and (R) are true and (R) is the correct explanation of (A)
B. If both (L) and (R) are true and (R) is not the correct explanation of (A)
C. If $(\mathrm{L})$ is true, but $(\mathrm{R})$ is false
D. If $(L)$ is false, but $(R)$ is true
80. Pointing to a woman in the photograph, person 'A' said, "The only daughter of her grandfather is my Wife". How is 'A related to that woman?
A. Uncle
B. Father
C. Maternal uncle
D. Brother
81. $\qquad$
A. Water
B. Wine
C. Caustic soda
D. Lime juice
82. Which of the following bonds electrons are transferred?
A. Covalent
B. Ionic
C. Hydrogen
D. None of these
83. KBJ, LCK, MDL, NEM, ......
A. OEP
B. OFN
C. MEN
D. PFQ
84. An examination of 3 hr duration has 200 questions of which 50 are physics problems. It is stated that twice as much time be spent on each physics problem as for each other question. How many minutes are to be spent on the physics problems.
A. 36
B. 72
C. 60
D. 100
85. A boat is moving upstream with velocity of $14 \mathrm{~km} / \mathrm{hr}$ and goes downstream with a velocity of $40 \mathrm{~km} / \mathrm{br}$, calculate the speed of the stream?
A. $13 \mathrm{~km} / \mathrm{hr}$
B. $26 \mathrm{~km} / \mathrm{hr}$
C. $34 \mathrm{~km} / \mathrm{hr}$
D. None of these
86. What is the smallest number by which 2880 must be divided in order to make it into a perfect square?
A. 3
B. 4
C. 5
D. 6
87. DNN, FPP, HRR, ___ LVV
A. GRR
B. OSS
C. JTT
D. ITT
88. Statement 1 : Pens cost more than pencils.

Statement 2 : Pens cost less than erasers.
Statement 3 : Erasers cost more than pencils and pens.
If the first two statements are true, the third statement is
A. True
B. False
C. Uncertain
D. Cannot be determined
89. If in a certain language, MADRAS is coded as NBESBT, how is BOMBAY coded in that code?
A. CPNCBN
B. CPNCBZ
C. CPOCBZ
D. CQOCBZ
90. Four usual dice are thrown on the ground. The total of numbers on the top faces of these four dice is 13 as the top faces showed $4,3,1$ and 5 respectively. What is the total of the faces touching the ground?
A. 12
B. 13
C. 15
D. Cannot be determined
91. I am facing East. Turning to the right I go 20 m , then turning to the left I go 20 m and turning to the right I go 20 m , then again turning to the right I go 40 m and then again I go 40 m to the right. In which direction am I from my original position?
A. North
B. West
C. South
D. East
92. $Q, R, S$ and $T$ are sitting on a bench. $P$ is sitting next to $Q, R$ is sitting next to $S$, $S$ is not sitting with $T$ who is on the left end of the bench. $R$ is in the second position from the right. $P$ is to the right of $Q$ and $T$. $P$ and $R$ are sitting together. In which position P is sitting?
A. Between $Q$ and $S$
B. Between $T$ and $S$
C. Between $Q$ and $R$
D. Between $R$ and $T$
93.

A.

B.

C.

D.

94. January, May, July, November. Find the odd month out
A. January
B. May
C. July
D. November
95. $6,9,15,18,24,26$. Find the odd number out
A. 6
B. 15
C. 24
D. 26
96. If DELHI is coded as CCIDD how would you encode BOMBAY
A. AJMTVT
B. AMJXVS
C. MJXVSU
D. WXYZAX
97. Gravity is related to pull in the same way as Magnetism is related to:
A. Repulsion
B. Separation
C. Attraction
D. Push
98. Select the pair from the following options, which has the same relationship like POSTSCRIPT : LETTER
A. PREAMBLE : DOCUMENT
B. GLOSSARY : REFERENCE
C. EPILOGUE : PLAY
D. SIGNATURE : PEN
99. $B$ is twice as old as $A$ but twice younger than $F . C$ is half the age of $A$ but is twice older than D . Who is the second oldest?
A. B
B. $F$
C. C
D. $D$
100. If Football is called Cricket, Cricket is called Basketball, Basketball is called Badminton, Badminton is called Volleyball, Volleyball is called Hockey and Hockey is called Golf, then which of the following games is not played using a ball?
A. Volleyball
B. Basketball
C. Hockey
D. Cricket

## ANSWER SHEET

|  | A | B | C | C |  | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E |  |  | A | B | C | D | E |  |  | A B | B | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | A | B | C | C D | D | E | 27 |  | A B | B | C | D | E | 52 |  | A | B | C | D | E | 77 |  | A B | B | D | E |
| 3 | A | B | C | C | D | E | 28 |  | A ${ }^{\text {B }}$ | B | C | D | E | 53 |  | A | B | C | D | E | 78 |  | A B | B | D | E |
| 4 | A | B | C | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E | 54 |  | A | B | C | D | E | 79 |  | A B | B | D | E |
| 5 | A | B | C | C |  | E | 0 |  | A B | B | C | D | E | 55 |  | A | B | C | D | E | 80 |  | A B | B | D | E |
| 6 | A | B | C |  |  | E | A |  | A ${ }^{\text {B }}$ | B | C | D | E | , |  | A | B | C | D | E | 81 |  | A B | B | D | E |
| 7 | A | B | C | , |  | E | A |  | A B | B | C | D | E | , |  | A | A | C | D | E | 2 |  | A B | B | D | E |
| 8 | A | B | C | C |  | E | 33 |  | A ${ }^{\text {B }}$ | B | C | D | E | 58 |  | A | B | C | D | E | 83 |  | A B | B | D | E |
| $9$ | A | B | C | C |  | E | 34 |  | B | B | C | D | E | 59 |  | A | B | C | D | E | 84 |  | A B | C | D | E |
|  | A | B | C | C |  | E |  |  | B | B | C | D | E |  |  | A | B | C | D | E |  |  | A B | B | D | E |
|  | A | B | C | C |  | E |  |  | B | B | C | D | E |  |  | A | B | C | D | E |  |  | A B | C | D | E |
|  | A | B | C | C |  | E | 7 |  | A B | B | C | D | E | 62 |  | A | B | C D | D | E | 87 |  | A B | C | D | E |
|  | A | B | C | c |  | E | A |  | A B | B | C | D | E | 63 |  | A | B | C | D | E | 88 |  | A B | B C | D | E |
|  | A | B | C | C |  | E | A |  | A B | B | C | D | E | 64 |  | A ${ }^{\text {A }}$ | B | C | D | E | 89 |  | A B | B | D | E |
|  | A | B | C | C |  | E | 40 |  | A B | B | C | D | E | 65 |  | A ${ }^{\text {B }}$ | B | C | D | E | 90 |  | A B | B | D | E |
|  | A | B | C | C |  | E |  |  | A B | B | C | D | E |  |  | A | B | C | D | E | 91 |  | A B | B | D | E |
|  | A | B | C | C |  | E |  |  | A B | B | C | D | E |  |  | A | B | C D | D | E | 2 |  | A B | C | D | E |
|  | A | B | C | C |  | E |  |  | B | B | C | D | E |  |  | A | B | C D | D | E | 93 |  | A B | C | D | E |
|  | A | B | C | C |  | E |  |  | A B | B | C | D | E |  |  | A | B | C | D | E | 94 |  | A B | B | D | E |
|  | A | B | C | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C D | D | E | 95 |  | A B | B | D | E |
| A | A | B | C | C | D | E |  |  | A B | B | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E | 96 |  | A ${ }^{\text {B }}$ | B | D | E |
|  | A | B | C | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E | 72 |  | A | B | C | D | E | 97 |  | A ${ }^{\text {B }}$ | B | D | E |
|  | A | B | C | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C D | D | E | 98 |  | A ${ }^{\text {B }}$ | B | D | E |
|  | A | B | C | C | D | E |  |  | A B | B | C | D | E |  |  | A ${ }^{\text {B }}$ | B | C D | D | E | 99 |  | A ${ }^{\text {B }}$ | B | D | E |
|  | A | B | C | C |  | E |  |  |  |  |  | D | E |  |  |  | $B$ | C D | D | E |  |  |  | C | D | E |

